

SUPPLEMENTAL AMENDMENT AND RESPONSE UNDER 37 CFR § 1.111

Serial Number: 10/041,725

Filing Date: January 8, 2002

Title: A TWO-HOP TELEMETRY SYSTEM USING A REPEATER FOR IMPLANTABLE MEDICAL DEVICESPage 2
Dkt: 279.396US1**IN THE CLAIMS**

Please amend the claims as follows:

1. (Currently Amended) An external telemetry interface device to assist in communication between an implantable medical device to be implanted in a patient, the implantable medical device carrying an inductive element and an external remote first far-field radio-frequency (RF) transceiver, the telemetry interface device including:
 - an inductive transceiver, configured to be communicatively coupled to the inductive element in the implantable medical device via a mutual inductance therebetween;
 - a second far-field RF transceiver, configured to be communicatively coupled to the remote first far-field RF transceiver;
 - a data buffer, coupled to the inductive and second far-field RF transceivers, to store data from the inductive and second far-field RF transceivers; and
 - a controller, coupled to the inductive and second far-field RF transceivers and the data buffer, to issue control signals directing communication by the inductive and second far-field RF transceivers using data from the data buffer, the controller including a data processing module to alter or remove a first header from data received from the implantable medical device and to provide a different second header to data to be provided to the remote first far-field transceiver.
2. (Original) The device of claim 1, further including a power source.
3. (Original) The device of claim 2, in which the power source includes a battery.
4. (Original) The device of claim 3, in which the battery is rechargeable.
5. (Original) The device of claim 1, in which the controller includes a data processing module.
6. (Original) The device of claim 5, in which the data processing module is configured to execute instructions compressing data in the data buffer.

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7. (Original) The device of claim 5, in which the data processing module is configured to execute instructions to obtain extracted information, from electrogram data received from the implantable device, for transmission by the second far-field RF transceiver to the remote first far-field RF transceiver.
8. (Original) The device of claim 7, in which the extracted information includes heart rate information.
9. (Original) The device of claim 7, in which the extracted information includes cardiac signal morphology information.
10. (Original) The device of claim 7, in which the extracted information includes times associated with intervals between heart depolarizations in the electrogram data.
11. (Original) The device of claim 7, in which the extracted information includes an alert condition relating to the patient's condition.
12. (Original) The device of claim 1, in which at least one of the inductive transceiver, the second far-field RF transceiver, and a third far-field RF transceiver is configured to be communicatively coupled to an external device associated with the patient.
13. (Currently Amended) An external telemetry interface device to assist in communication between an implantable medical device to be implanted in a patient and a remote far-field radio-frequency (RF) transceiver, the telemetry interface device including:
- a first transceiver, configured to be communicatively coupled to the implantable medical device;
 - a second transceiver, configured to be communicatively coupled to the remote far-field RF transceiver;
 - a data buffer, coupled to the first and second transceivers, to store data from the first and second transceivers; and

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a controller, coupled to the first and second transceivers and the data buffer, to issue control signals directing communication by the first and second transceivers using data from the data buffer, the controller including a data processing module configured to execute instructions to ~~obtain-extracted~~ externally extract physiologic information, from electrogram data received from the implanted device via the first transceiver, for transmission by the second transceiver to the remote far-field RF transceiver.

14. (Original) The device of claim 13, in which the extracted information includes heart rate information.

15. (Original) The device of claim 13, in which the extracted information includes cardiac signal morphology information.

16. (Original) The device of claim 13, in which the extracted information includes times associated with intervals between heart depolarizations in the electrogram data.

17. (Original) The device of claim 13, in which the extracted information includes an alert condition relating to the patient's condition.

18. (Original) The device of claim 13, in which at least one of the first transceiver, the second transceiver, and a third transceiver is configured to be communicatively coupled to an external device associated with the patient.

19. (Currently Amended) A method of communicating between an implantable medical device to be implanted in a patient and an external remote far-field RF transceiver, the method including:

transceiving with the implantable medical device an inductively-coupled first communication signal, the transceiving with the implantable medical device including using an intermediary external transceiver that is separate from the external remote far-field RF transceiver;

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transceiving with the external remote far-field RF transceiver a second communication signal, the transceiving with the external remote far-field RF transceiver including using the intermediary external transceiver; and

externally buffering data received from at least one of the first and second communication signals, the externally buffering data including removing or altering a first header on data received from the implantable device and providing a different second header on data to be provided to the external remote far-field transceiver.

20. (Original) The method of claim 19, further including compressing data from at least one of the first and second communication signals.

21. (Original) The method of claim 19, further including extracting information from electrogram data included in the first communication signal.

22. (Original) The method of claim 19, further including extracting heart rate information from the first communication signal.

23. (Original) The method of claim 19, further including extracting cardiac signal morphology information from the first communication signal.

24. (Original) The method of claim 19, further including extracting from the first communication signal time intervals between heart depolarizations.

25. (Original) The method of claim 19, further including:

extracting information from electrogram data included in the first communication signal;
processing the extracted information to determine whether an alert condition is present;

and

communicating the alert condition to the external remote far-field RF transceiver if the alert condition is present.

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26. (Original) The method of claim 19, further including transceiving, with an external device associated with the patient, a third communication signal.

27. (Currently Amended) A method of communicating between an implantable medical device that is implanted in a patient and an external remote far-field RF transceiver, the method including:

transceiving with the implantable medical device a first communication signal;

externally extracting physiologic information from electrogram data included in the first communication signal, the extracting using an intermediary external device that is separate from the external remote far-field RF transceiver; and

externally transceiving with the external remote far-field RF transceiver a second communication signal that includes information that is based on the physiologic information that was externally extracted from the electrogram data included in the first communication signal.

28. (Previously Presented) The method of claim 27, further including externally buffering data received from at least one of the first and second communication signals.

29. (Previously Presented) The method of claim 27, further including:

externally processing the extracted information to determine whether an alert condition is present; and

communicating the alert condition to the external remote far-field RF transceiver if the alert condition is present.

30. (Original) The method of claim 27, further including transceiving, with an external device associated with the patient, a third communication signal.

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31. (Currently Amended) A method of communicating between an implantable medical device to be implanted in a patient and an external remote transceiver, the method including:

transceiving with the implantable medical device a first communication signal, the transceiving with the implantable medical device including using an intermediary external transceiver that is separate from the external remote transceiver;

externally processing the first communication signal to generate a second communication signal, the externally processing including removing or altering a first header on data received in the first communication signal and providing a different second header on data to be provided in the second communication signal; and

transceiving with the external remote transceiver the second communication signal, the transceiving with the external remote transceiver including using the intermediary external transceiver.

32. (Original) The method of claim 31, in which the processing includes translating between a first communication protocol of the first communication signal and a different second communication protocol of the second communication signal.

33. (Original) The method of claim 31, in which the processing includes compressing data in the first communication signal and including the compressed data in the second communication signal.

34. (Original) The method of claim 31, in which the processing includes combining data from the implantable medical device with data received from another sensor associated with the patient, and including the combined data in the second communication signal.

35. (Currently Amended) An external intermediary telemetry interface device to assist in communication between an implantable medical device to be implanted in a patient and a remote external transceiver, the external intermediary telemetry interface device separate from the remote external transceiver and including:

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an external first transceiver, configured to be communicatively coupled to the implantable medical device to transceive a first communication signal;

an external RF second transceiver, configured to be communicatively coupled to the remote transceiver to transceive a second communication signal; and

an external controller, coupled to the first and second transceivers, the controller including a signal processor to process the first communication signal from the first transceiver to remove or alter a first header and provide the resulting second communication signal with a different second header to the second transceiver.

36. (Previously Presented) The device of claim 35, in which the signal processor is configured to translate between a first communication protocol of the first communication signal and a different second communication protocol of the second communication signal.

37. (Previously Presented) The device of claim 35, in which the signal processor is configured to compress data in the first communication signal, and to include the compressed data in the second communication signal.

38. (Previously Presented) The device of claim 35, in which the signal processor is configured to combine data from the implantable medical device with data received from another sensor associated with the patient, and to include the combined data in the second communication signal.